

This fact sheet is a brief summary of the Proposed Cleanup for the Elizabeth Mine Site. As presented in more detail in the Proposed Plan and Feasibility Study Report, EPA has identified cleanup actions for five areas of the Elizabeth Mine Site that are not subject to the two previous cleanup actions at the Elizabeth Mine Superfund Site. The two previous cleanup actions are the 2002 Non-Time-Critical Removal Action (NTCRA) and the 2003 Time-Critical Removal Action (TCRA). The NTCRA and TCRA target the three major areas of contamination at the Site: Tailing Pile 1 (TP-1), Tailing Pile 2 (TP-2), and the waste rock/heap leach area referred to as Tailing Pile 3 (TP-3).

The five areas that are the subject of this fact sheet and the proposed cleanup plan are shown on the adjacent Figure and are listed below:

- Lord Brook Source Areas (LBSA)
- Upper and Lower Copperas Factories (CF)
- Sediments (SED)
- WWII-Era Infrastructure Area (IA)
- Site Wide Groundwater (SW)

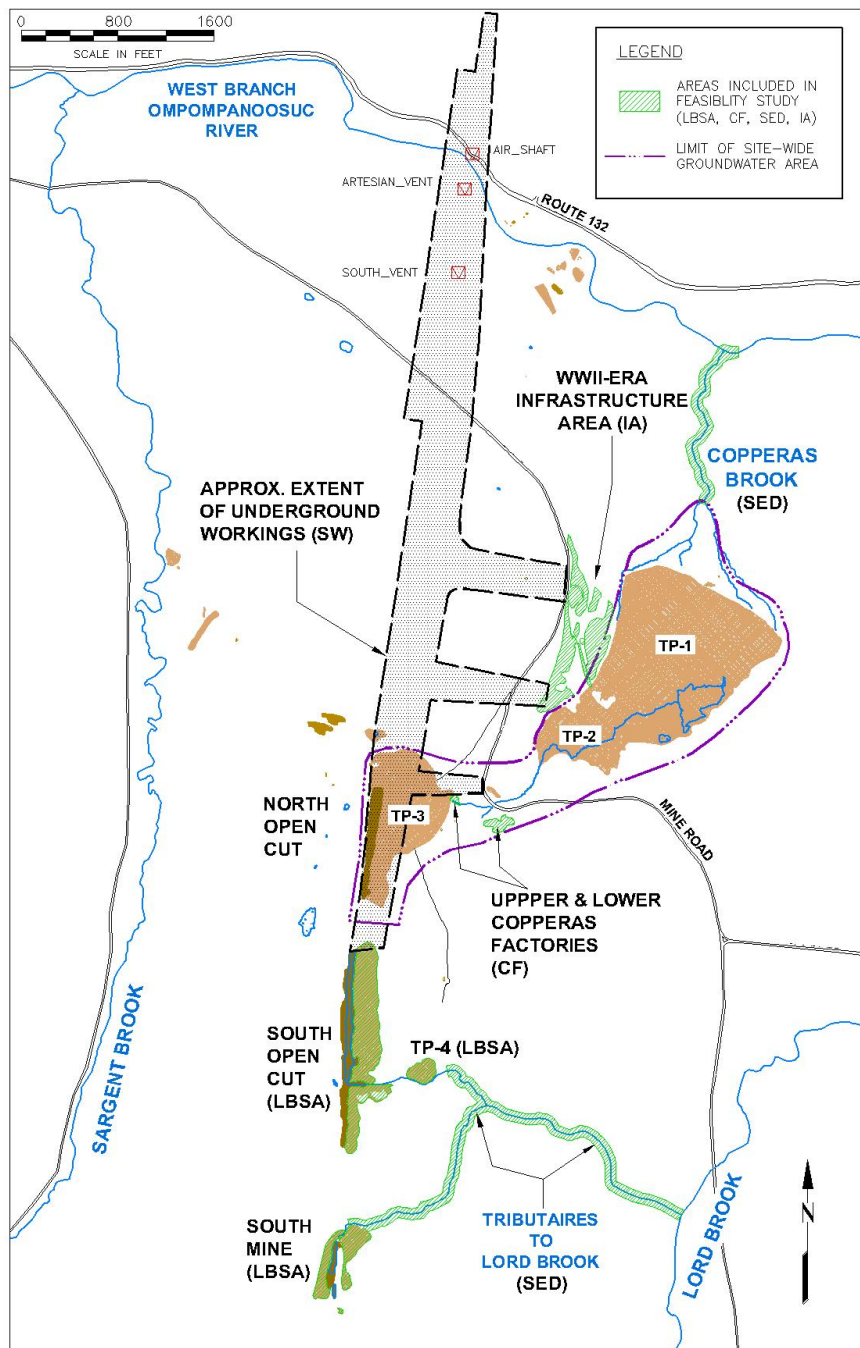
This fact sheet includes only a brief summary of the cleanup options under consideration for each of these areas. A more detailed presentation of the cleanup options can be found in the Feasibility Study Report and the Proposed Plan for the Elizabeth Mine. These documents, along with the Remedial Investigation Report, Human Health Risk Assessment Report, and Baseline Ecological Risk Assessment Report are part of the Elizabeth Mine Administrative Record that can be found at the locations identified on page 10 of this fact sheet. EPA is seeking comments regarding the proposed cleanup plan that is summarized in this fact sheet and presented in further detail in the Proposed Plan and Elizabeth Mine Feasibility Study Report. EPA is also seeking comments regarding the findings relating to potential impacts to wetlands, aquatic resources, historic resources, and a Technical Impracticability waiver.

## Public Meetings

Two public meetings will be held as part of the public comment process. The first will be a Public Information Meeting to learn more about the proposed cleanup plan. **The Public Information Meeting will be held on July 11, 2006 at 7:00 p.m. at Barrett Hall, Route 132, South Strafford, Vermont.**

The second meeting will be a formal comment session that provides people an opportunity to speak their comments about the Proposed Plan into the public record. **The Public Hearing will be held at 7:00 p.m. on August 1, 2006 at Barrett Hall Route 132, South Strafford, VT.**

**In addition to the public hearing, you may offer comments in writing:** postmarked no later than August 11, 2006 to: Edward Hathaway, Project Manager, U.S. EPA Region 1 Congress Street Suite 1100 (HBT) Boston, MA 02114-2023  
**Or E-mail comments** by August 11, 2006 to: [hathaway.ed@epa.gov](mailto:hathaway.ed@epa.gov). For further information about this meeting, call EPA Community Involvement Coordinator Pam Harting-Barrat (617) 918-1318, or toll-free at 1-888-372-7341 ext. 81318.



## **Lord Brook Source Areas - Description of the Area:**

There are three areas of former mining activity in the Lord Brook Watershed.

**South Open Cut:** An area of rock that was excavated to supply copper ore during the 1950's. A portion of the excavation has filled with water forming a mine pit lake. The pit lake water drains through a haulage way that was blasted through the bedrock and forms the headwaters of a small tributary to Lord Brook.

**South Mine:** An area of mining activity near the South Open Cut. It is believed that ore was mined from this area during the 1800's. A small mine pit lake has since formed and the area is now the headwaters for another small tributary to Lord Brook.

**Tailing Pile 4 (TP-4):** A pile of waste rock that resulted from the blasting of the haulage way leading into the South Open Cut.

## **Why is an action needed for this area?**

The South Open Cut, TP-4, and South Mine are the major sources of the degradation of Lord Brook and the unnamed tributaries that drain from these source areas to Lord Brook. The sulfur rich waste rock and wall rock is releasing acid and metals that are adversely affecting fish, benthic invertebrates, amphibians, and periphyton (algae). For the South Open Cut and TP-4, the major source of contamination is believed to be the exposed waste rock and wall rock within the dry portion of the South Open Cut and TP-4. For the South Mine, the major source of contamination is believed to be the groundwater and surface water percolation through an area of waste rock at the edge of the South Mine pit lake. Elimination of these sources should improve water quality in Lord Brook and the unnamed tributaries so that they meet federal Clean Water Act and Vermont Water Quality Standards. There are no human health threats from the release of hazardous substances in the Lord Brook Source Area.

## **Cleanup Options under Consideration:**

EPA evaluated four cleanup options in detail in the Elizabeth Mine Feasibility Study for the Lord Brook Source Areas (LBSA):

**LBSA-1: No Action.** EPA is required to consider a No Action alternative. Although no action would be taken, the site would still be subject to review at least every five years.  
**Cost: Present value of \$32,450 for five year reviews.**

**LBSA-2B: Collect all the surface water flow from the source areas and treat the water using an innovative passive technology and discharge the treated water.** TP-4 would be consolidated into the South Open Cut and surface water would be diverted around the source areas to the extent possible. All of the surface water flow from the South Mine and South Open Cut would be collected in retention ponds. The water from the ponds would flow through a treatment system to reduce the concentration of contaminants to meet discharge criteria. Land use controls would also be required to prevent exposure to contaminants and to protect the remedy. **Capital Cost: \$3.2 million; Annual Operation and Maintenance (O & M) Cost: \$97,000 year; Present value of capital and O&M: \$4.5 million.**

**LBSA-3: Consolidate the waste rock from TP-4, South Mine, and other areas into the South Open Cut to fill the cut, fill the South Mine, and cover the waste.** All of the waste rock, whether exposed or currently buried, would be consolidated into the South Mine and South Open Cut pits. The waste material would be covered to reduce infiltration into the waste and may be treated with lime or

other materials to prevent subsurface acid rock drainage. It is possible that portions of TP-3 could be placed in the South Open Cut if the design for the Non-Time-Critical Removal Action indicates that a substantial portion of TP-3 should be re-located to allow that area to be covered. By filling the South Mine and South Open Cut and covering the waste the acid rock drainage from these areas would be eliminated. Land use controls would also be required to prevent exposure to contaminants and to protect the remedy. **Capital Cost: \$7.1 million; Annual O & M Cost: \$23,000 year; Present value of capital and O&M: \$7.4 million.**

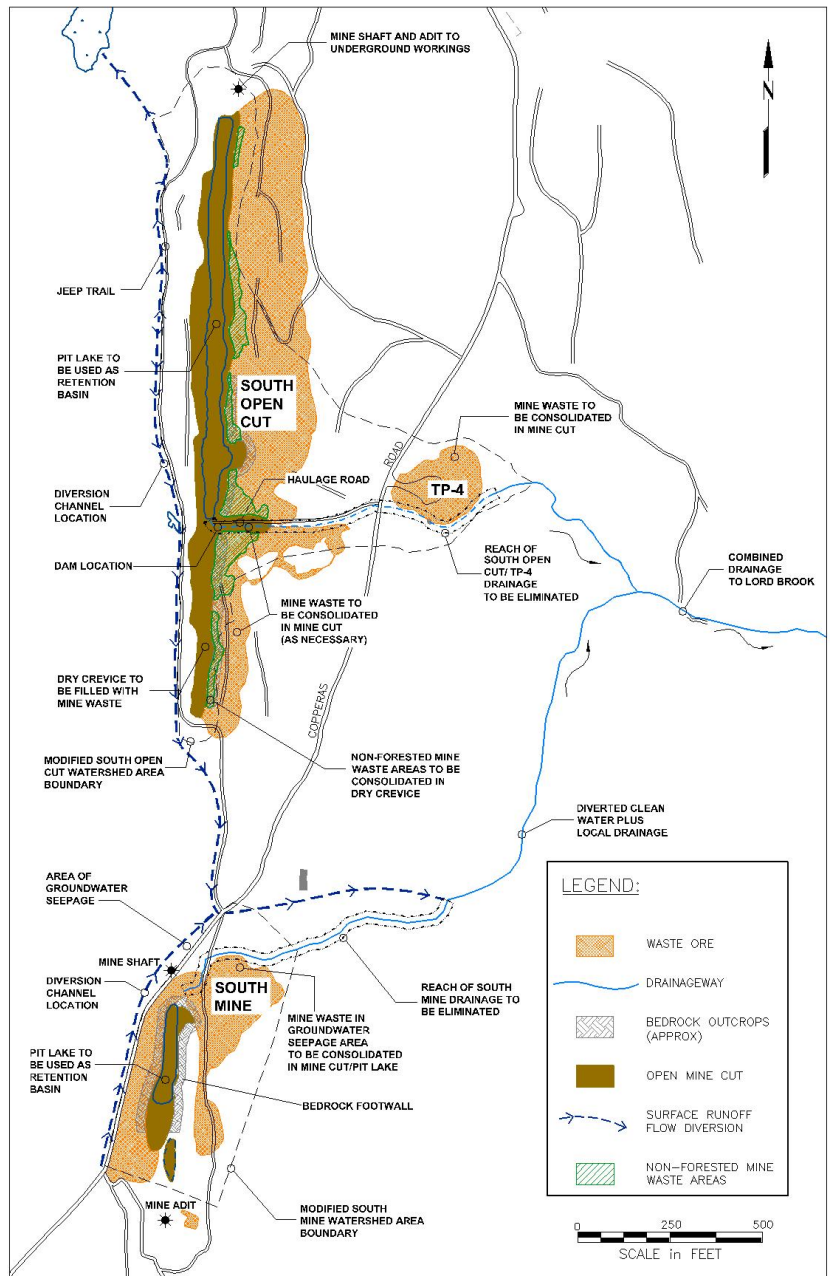
**LBSA-4: Consolidate waste rock from the South Mine and TP-4 waste into the dry portion of the South Open Cut, diversion of surface water, and discharge to the surface water or the groundwater.** Similar to alternative LBSA-3, the waste rock from TP-4 would be consolidated into the South Open Cut. A portion of the waste rock from the South Mine may also be consolidated into the South Open Cut. The waste material would be covered with a vegetative soil cover to reduce infiltration into the waste and may be treated with lime or other materials to prevent subsurface acid rock drainage. This alternative would be designed to minimize both the overall disturbance to the well forested area surrounding the South Mine and South Open Cut and the impacts to the historic features. Surface water would be diverted around the South Mine and South Open Cut. The South Mine pit lake may be drained and acid generating waste material removed. The South Mine pit lake would be allowed to restore itself to act as a detention basin and for historic preservation. The South Open Cut pit lake would also remain as a retention basin.

South Open Cut



The water level in the pit lake would be increased by construction of a dam near the former haulage way from the South Open Cut. The increased water level would also decrease acid rock drainage by reducing the surface area of sulfur rich wall rock with atmospheric oxygen. The pit lake from the South Open Cut would be a component of the remedial action by providing storage to allow for a controlled discharge of water from the pit lake. The design for LBSA-4 would evaluate whether the residual flow of 2 gallons per minute from the South Open Cut or 5 gallons per minute from the South Mine would be discharged to groundwater via an infiltration gallery, to the underground workings via the open tunnel (for the South Open Cut only), or directly discharged into the tributary of Lord Brook. Short-term treatment of the water may be considered if construction activities are expected to cause a decrease in water quality. Land use restrictions would be included to prevent any damage to the final cover and drainage control systems and to prevent exposure of buried waste rock adjacent to the South Open Cut. If implemented, the cleanup action would also include monitoring of surface water to evaluate the success of the cleanup. The cleanup action would be reviewed every five years to ensure that the cleanup remains protective. Long-term treatment of the discharge from the South Open Cut and South Mine is not expected to be necessary. **Capital Cost: \$3.7 million; Annual O & M Cost: \$24,600 year; Present value of capital and O&M: \$4.1 million.**

EPA selected **LBSA 4** as the preferred cleanup option because it offers the most cost effective approach to achieve the cleanup objectives. Alternative 2B was not selected since it could not reliably achieve the discharge criteria. Although LBSA-3 would be a more permanent and reliable long-term solution, alternative LBSA-4 would achieve a similar level of protection for substantially less cost and with much less significant short-term impacts. The short-term impacts associated with LBSA-3 that would be avoided by the selection of alternative LBSA-4, include clearing and disturbance of a large area of well established forest to access the 82,000 cubic yards of material needed to fill the South Open Cut and potential road issues (traffic and road damage) associated with hauling material to complete the filling of the South Open Cut. In addition, the level of uncertainty associated with the cost of alternative LBSA-3 suggests that the cost difference between LBSA-4 and LBSA-3 could be much greater than the two million dollar differential for capital costs that is currently reflected in the Feasibility Study. EPA has identified LBSA-4 as the least damaging practicable alternative with respect to protecting federally regulated wetlands and aquatic resources from acid mine drainage at the South Mine and South Open Cut. The pit lakes would become part of the source control actions to reduce acid rock drainage downstream. Unavoidable impacts to wetlands and aquatic resources that are disturbed to remove TP-4 and the source material at the South Mine,



as well as to install the surface water diversion and discharge systems, may occur. EPA has concluded that adverse impacts to historic resources are unavoidable and necessary to protect human health and the environment. Alternatives LBSA 2B and LBSA 4 would have the lowest degree of impacts to historic features of the alternatives.

EPA is seeking comments on the Lord Brook Source Areas (LBSA) alternatives, the preferred cleanup option LBSA 4, along with the findings of potential impacts to historic resources, wetlands, and aquatic resources. EPA is also providing notice and seeking public input regarding the possibility that EPA may re-evaluate the cleanup approach for the LBSA if the outcome of the NTCRA design suggests that the most cost effective approach to manage the waste from TP-3 would be to place the material within the South Open Cut. Using TP-3 as the fill material for the South Open Cut would eliminate the short-term impacts associated with LBSA-3.

## Copperas Factories -Description of the Area:

The upper and lower Copperas Factories produced copperas at the Elizabeth Mine from about 1809 to 1882. The Copperas production is among the most historically significant aspects of the Elizabeth Mine Site. The remains of the upper Copperas Factory are located along Copperas Brook immediately below Tailing Pile 3 (TP-3). The remains of the lower Copperas Factory are located along the opposite side of Copperas Brook just off Mine Road. Partially buried stone foundations are the most visible remnant of these factories.

## Why is a cleanup action needed for this area?

The upper and lower Copperas Factories are potential threats to human health. The soil within and surrounding the Copperas Factories contains lead at a concentration significantly above levels safe for human exposure.

## Cleanup options under consideration:

Three cleanup options were evaluated in detail in the Elizabeth Mine Feasibility Study for the upper and lower Copperas Factories (CF).

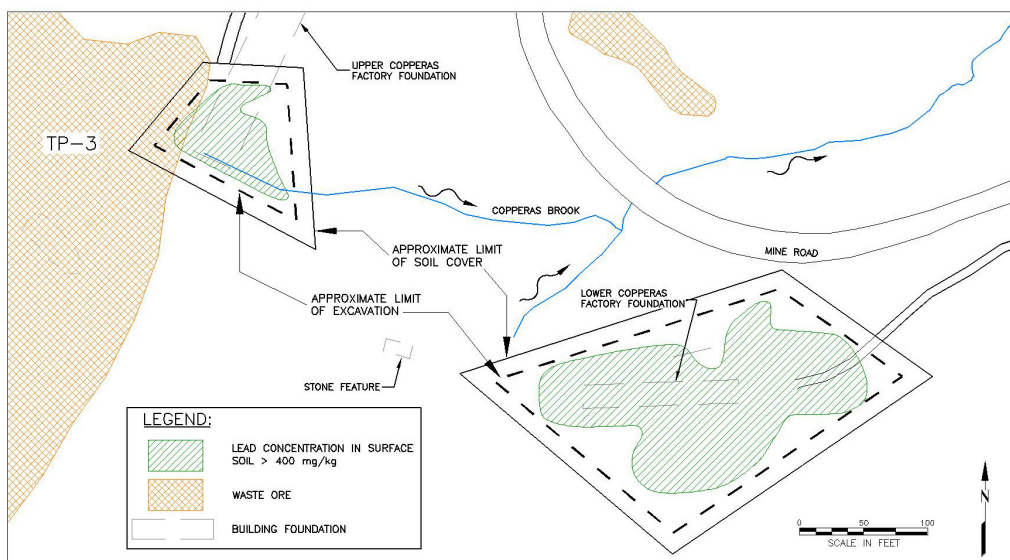
**CF-1: No Action.** No action would be taken to protect people from exposure to the lead contaminated soil. Although no action would be taken, the site would still be subject to review at least every five years. **Cost: Present value of \$32,450 for five year reviews.**

**CF 2: Excavation and treatment with on-site disposal.** Lead contaminated soil with a concentration above 400 mg/kg would be excavated, stabilized to prevent leaching, and placed under the TP-1 cover system. Every effort would be made to preserve the Copperas Factory foundations. **Capital Cost: \$1.5 million; Annual O & M Cost: \$4,350 year; Present value of capital and O&M: \$1.6**

**CF-4: In-place capping of the lead contaminated soil and institutional controls.** A two foot soil cover would be placed over the lead contaminated soil with a concentration above 400 mg/kg. Every effort would be made to preserve the Copperas Factory foundations. Monitoring of contaminants left in place and land use controls would also be required to prevent exposure to contaminants and to protect the remedy. **Capital Cost: \$0.613 million; Annual O & M Cost: \$10,830 year; Present value of capital and O&M: \$0.769 million.**



Foundation of former Copperas Factory



EPA selected **CF-4** as the preferred cleanup option. This option provides a contact barrier to prevent human exposure to the lead contaminated soil and best preserves the copperas factory foundations. This option also includes monitoring and land use restrictions to prevent disturbance of the cover system that could allow exposure of the lead contaminated soil. There will be a yearly survey to assess compliance with land use controls. This cleanup action would be reviewed every five years to ensure that the cleanup remains protective of public health and the environment.

EPA has made a finding that unavoidable impacts would also occur to some wetlands and aquatic resources surrounding the Copperas Factories, but that CF-4 represents the least damaging practicable alternative regarding the potential alteration of federally regulated wetlands and aquatic habitats. EPA has concluded that adverse impacts to historic resources are unavoidable and necessary to protect human health and the environment. EPA is seeking comments on the cleanup approach for the Copperas Factories (CF) options, the preferred cleanup option for CF along with the findings of potential impacts to historic resources, wetlands and aquatic resources.

## Sediments - Description of the Area:

There are two areas where the concentration of metals in the sediments may be contributing to the impacts to aquatic organisms.

**Lower Copperas Brook and the West Branch of the Ompompanoosuc Mixing Zone:** Lower Copperas Brook begins where the sediment basin below TP-1 discharges into Copperas Brook and extends for about 0.3 miles to the West Branch of the Ompompanoosuc River (WBOR). The WBOR Mixing Zone is a 1700 foot section of the WBOR just downstream of the confluence with Copperas Brook where the water from Copperas Brook is not fully mixed with the WBOR.

**Tributaries to Lord Brook:** The unnamed tributaries to Lord Brook are two small streams that form a single stream and discharge to Lord Brook just above New Boston Road

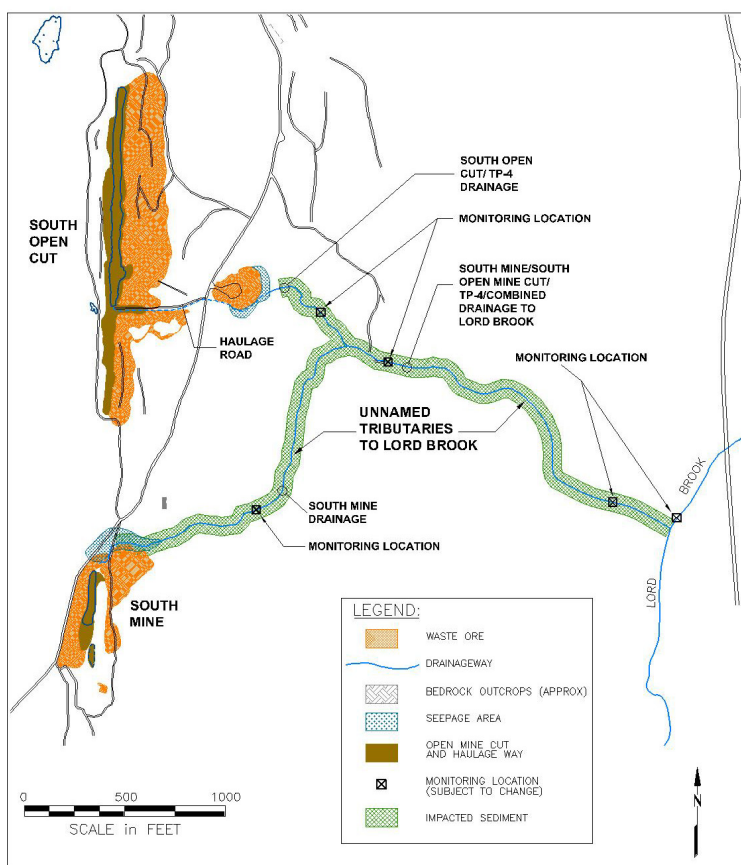
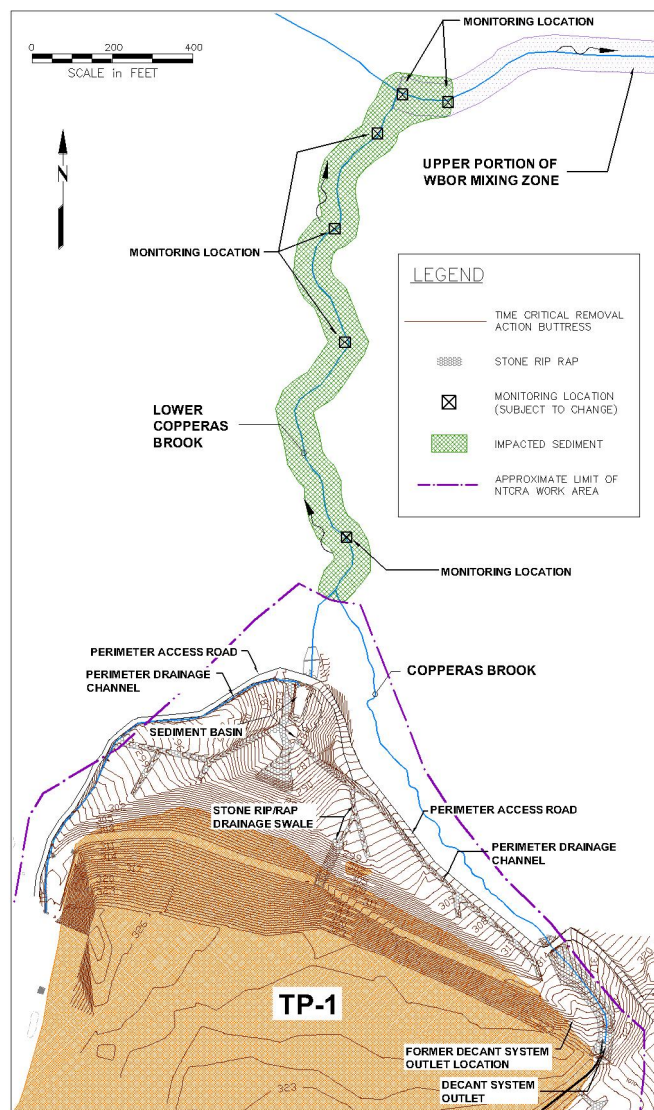
## Why is a cleanup needed for these areas?

The sediments in lower Copperas Brook, a 150 foot section of the WBOR Mixing Zone just below the confluence with Copperas Brook, and the unnamed tributaries to Lord Brook are toxic to aquatic organisms. These sediments may slow the recovery of the biological community after completion of the cleanup actions for the source areas. There is no identified human health threat from these sediments.

## Cleanup options under consideration:

Three cleanup options were evaluated in detail in the Elizabeth Mine Feasibility Study for the Sediments (SED).

**SED-1: No action** would be taken to remove or monitor the sediments. Although no action would be taken, the site would still be subject to review at least every five years. **Cost: Present value of \$32,450 for five year reviews.**



**SED-2: Monitored Natural Recovery.** The assumption for this cleanup option is that NTCRA and Lord Brook Source Area cleanup actions along with natural sediment transport and burial processes will result in sediment that will no longer be toxic to aquatic organisms at some point in time after the completion of the source control actions. Monitoring would be performed to evaluate changes in the sediment over time. **Capital Cost: \$0.01 million; Annual O & M Cost: \$9,750 year; Present value of capital and O&M: \$0.390 million.**

**SED-3: Excavation and consolidation:** The sediments in these areas would be excavated and placed on TP-1 and the streams would be restored. **Capital Cost: \$2.8 million; Annual O & M Cost: \$36,919 year; Present value of capital and O&M: \$3.4 million.**

EPA has selected **SED-2 – Monitored Natural Recovery** as the preferred cleanup option. EPA is seeking comments on this option as well as the potential impacts to wetlands and aquatic resources areas that could occur as a result of the long-term monitoring activities. EPA has identified SED-2 as the least damaging practicable alternative with respect to federally regulated wetlands and aquatic habitats since the current wetlands along the waterways will not be disturbed. This cleanup action would be reviewed every five years to ensure that the cleanup remains protective of public health and the environment.

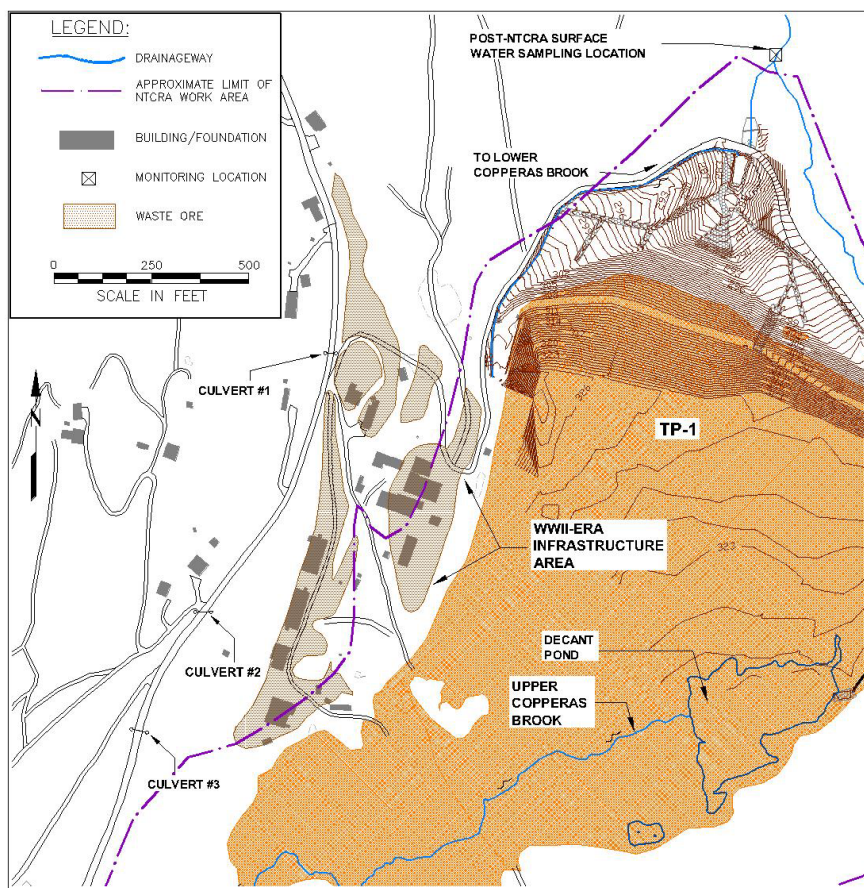
## WWII-Era Mine Infrastructure Area -

### Description of the Area:

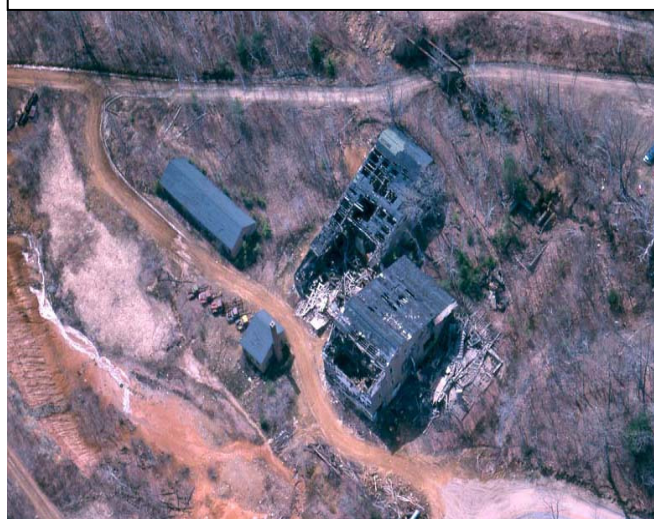
The WWII Era Infrastructure Area is the waste rock fill area beneath and surrounding the World War II mine buildings. Much of the waste is buried beneath the foundations or forest cover, but some of the waste is exposed and is releasing acid rock drainage.

### Why is cleanup needed for this area?

While this area is not believed to be a significant source of contamination in the Copperas Brook watershed, the exposed waste rock within the WWII-Era Infrastructure Area contributes acid mine drainage that may cause Copperas Brook to continue to violate state and federal water quality standards even after the completion of the other cleanup actions (NTCRA). A significant portion of the exposed waste in this area may be covered as part of the NTCRA due to the grading requirements for the TP-1 cover system and surface water/groundwater diversion system. There is no known threat to human health from the mine waste in this area. The only groundwater impacted by the mine waste is located within the mine waste. Bedrock groundwater beneath the area has not been affected.



World War II-Era Mine Infrastructure



under the TP-1 cover system. **Capital Cost: \$5.0 million; Annual O & M Cost: \$10,425 year; Present value of capital and O&M: \$5.2 million.**

**IA-4: Monitoring and Institutional Controls.** Monitoring to confirm that the post-NTCRA acid rock drainage does not violate federal or state water quality standards at a point of compliance in Copperas Brook below TP-1 and land use restrictions to prevent the exposure of additional mine waste. **Capital Cost:\$0 Annual O & M Cost: \$17,850 year; Present value of capital and O&M: \$0.254 million.**

EPA has selected **IA-4** Monitoring and Institutional Controls as the preferred cleanup option. Recent information suggests that the NTCRA will grade and cover the most significant areas of exposed waste rock in this area. As a result, the combination of land use restrictions to protect the NTCRA and prevent an additional waste rock from being exposed (which will be periodically surveyed to determine compliance) and long-term monitoring will provide the most cost effective way to address the limited impacts associated with this area. This cleanup action would be reviewed every five years to ensure that the cleanup remains protective of public health and the environment.

### Cleanup options under consideration:

Four cleanup options were evaluated in detail in the Elizabeth mine Feasibility Study Report:

**IA-1: No Action:** No actions would be taken to monitor the acid rock drainage or prevent exposure of additional mine waste. Although no action would be taken, the site would still be subject to review at least every five years. **Cost: Present value of \$32,450 for five year reviews**

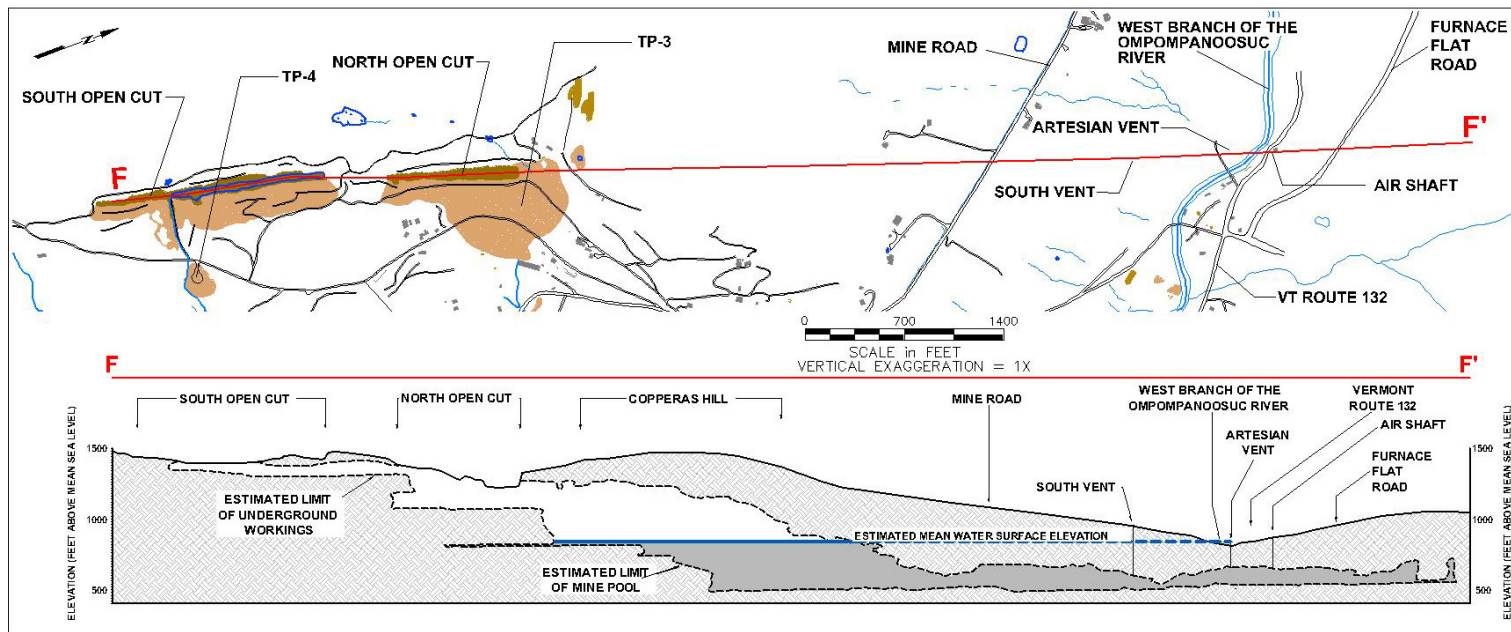
**IA-2: Grading, covering, and surface water diversion.** Exposed mine waste would be graded and covered to prevent acid rock drainage. Surface flow would be diverted around the mine waste. Land use controls would also be required to prevent exposure to contaminants and to protect the remedy. **Capital Cost: \$1.0 million; Annual O & M Cost: \$15,150 year; Present value of capital and O&M: \$1.3 million.**

**IA-3: Excavation and consolidation onto TP-1.** The estimated 60,000 cubic yards of mine waste would be excavated and placed

## Site Wide Groundwater - Description of the area:

There are two distinct areas that are the focus of the groundwater cleanup:

1. Underground workings/mine pool The “mine pool” is the water that is contained in the mine tunnels. The water in the mine pool is contaminated by contact with waste rock and the sulfur ore wall rock. It then discharges to the WBOR through the air vent pipe. The water discharged from the mine pool at the air vent does not significantly affect the water quality of the WBOR. The location of the underground workings is shown below. The line for F to F' indicates the approximate location of the underground workings. The side view below shows the portion of the underground workings believed to be full of water (mine pool).
2. Groundwater beneath and adjacent to TP-1, TP-2, and TP-3: Groundwater within the till and bedrock beneath and adjacent to TP-3 contains elevated levels of metals. Groundwater within the upper till beneath and adjacent to TP-1 and TP-2 also contains elevated metal concentrations. The extent of groundwater impacts associated with TP-1, TP-2, and TP-3 are shown on the Figure on the next page.



## Why is cleanup needed for this area?

Fortunately, none of the residential wells in current use have been adversely affected by the Site. However, the groundwater beneath and adjacent to TP-1, TP-2, and TP-3 as well as the water within the mine pool are unsuitable as a source of drinking water. EPA normally requires the restoration of contaminated aquifers. There are two exceptions to the restoration requirement:

1. Groundwater beneath waste areas that are covered and require perpetual maintenance is not required to comply with federal and state drinking water and groundwater standards. The area beneath TP-1, TP-2, and TP-3, as well as the areas within the extent of the cleanup structures (cover systems, diversion channels), is within the Waste Management Area and will be delineated as a groundwater restriction area. Monitoring is performed at the edge of the groundwater restriction area to document that nearby water supplies are not at risk. The groundwater restriction area is shown on the Figure on the next page.
2. EPA is invoking a statutory Technical Impracticability Waiver, as permitted by CERCLA, for the groundwater within the underground workings. EPA has determined that it is technically impracticable, from an engineering perspective, to achieve Federal Maximum Contaminant Levels (MCLs), Maximum Contaminant Level Goals (MCLGs) of the Safe Drinking Water Act and the State of Vermont Primary Groundwater Protection Standards for the water within the underground workings (mine pool). Therefore, EPA is waiving these standards as applicable or relevant and appropriate requirements for the groundwater within the underground workings. This waiver applies to all of the inorganic constituents that are present in the naturally occurring material at the Site and specifically to cadmium, copper, manganese, mercury, and nickel which have been detected in the groundwater of the underground workings at concentrations above either MCLs, MCLGs, or the Vermont Primary Groundwater Protection Standards. The primary basis for this finding is that the source of the contamination, the wall rock and waste rock within the underground workings, will generate the condition that causes the water to exceed the standards for hundreds, if not thousands of years. The Technical Impracticability Zone is shown on the Figure on the following page. EPA has determined that contaminated water within the underground workings is not causing the adjacent bedrock aquifer to exceed federal or state drinking water or groundwater standards.

Therefore the proposed remedy incorporating this waiver is protective of human health and the environment as long as land use controls are implemented to prevent drinking water wells from being installed that would draw water from the underground workings. A more detailed discussion of the Technical Impracticability waiver can be found in Appendix D of the Feasibility Study

### **Cleanup options under consideration:**

Two alternatives were evaluated in detail in the Feasibility Study:

**SW-1: No Action.** No activities would be implemented to monitor the groundwater or prevent human consumption in the future. Although no action would be taken, the site would still be subject to review at least every five years. **Cost: Present value of \$32,450 for five year reviews.**

**SW-2: Monitoring and Institutional Controls.** This alternative includes long-term monitoring of the groundwater and land use restrictions. These restrictions may take the form of restrictive covenants, local ordinances, or deed notices to prevent future use of contaminated groundwater. All of the properties that are located above the underground workings as well as the properties within the area of groundwater impacts associated with TP-1, TP-2, and TP-3 will have some type of land use restriction to prevent future use of the groundwater within the underground workings or contaminated groundwater associated with TP-1, TP-2, and TP-3. Periodic inspections would be performed to assess compliance with the land-use restrictions. **Capital Cost: \$0.345 million; Annual O & M Cost: \$12,450 year; Present value of capital and O&M: \$0.542 million.**

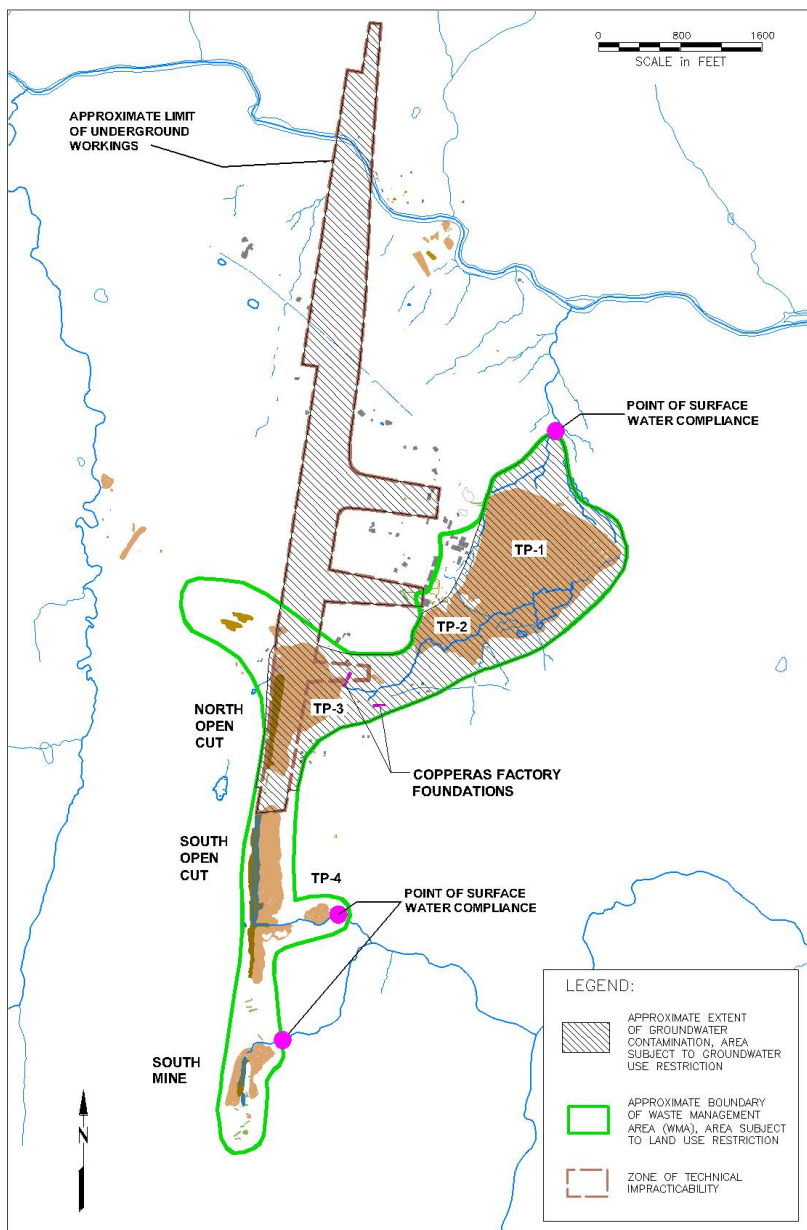
EPA has selected **SW-2** as the preferred cleanup option. This approach will focus on preventing future use of the contaminated groundwater through institutional controls and long-term monitoring. In addition, there will be land use restrictions to prevent disturbance to any component of the remedy within the Waste Management Area. EPA is seeking comment on the Technical Impracticability waiver along with the potential for short-term impacts to federally regulated wetlands that may be associated with the installation or sampling of monitoring wells.

### **Why does EPA recommend the cleanup actions identified in the proposed cleanup plan?**

EPA performed a two stage evaluation of the alternatives for each of the five areas. First, the alternatives were evaluated to determine whether they meet the threshold criteria. The threshold criteria are:

- Protection of human health and the environment
- Compliance with applicable or relevant and appropriate regulations

The No Action alternatives failed these criteria for each area. All of the other cleanup options that were evaluated satisfy the threshold criteria, except for the CERCLA Technical Impracticability waiver of groundwater and



drinking water standards for the water in the underground workings. The second evaluation is designed to balance the strengths and weaknesses of each alternative based upon five criteria. These balancing criteria are:

- Long-term effectiveness and permanence
- Short-term effectiveness
- Reduction in the toxicity, mobility, or volume of contamination through treatment
- Implementability
- Costs

Two additional criteria, State Acceptance and Community Acceptance are evaluated based on the input during the public comment period that will occur from July 12 – August 11, 2006.

The preferred cleanup options are the alternatives that satisfied the threshold criteria and provided the best balance of the balancing criteria. In addition, the State of Vermont Agency for Natural Resources and the Elizabeth Mine Community Advisory Group reviewed the Proposed Plan. Both the Vermont Agency for Natural Resources and the Elizabeth Mine Community Advisory Group are in agreement with the options selected by EPA as the preferred alternatives in this fact sheet and the Proposed Plan.

In summary, the alternatives selected by EPA as the preferred alternatives are:

**LBSA 4: Consolidate waste rock from the South Mine and TP-4 waste into the dry portion of the South Open Cut, diversion of surface water, and discharge to the surface water or the groundwater.** All of the TP-4 waste rock and a portion of the South Mine waste rock would be consolidated into the dry portion of the South Open Cut. Surface water would be diverted around the South Open Cut and South Mine. The remaining flow from the South Open Cut and South Mine would discharge to the surface water or the groundwater in compliance with applicable standards. **Total Cost: \$4.1 million.**

**CF 4: In-place capping of the lead contaminated soil and institutional controls.** A two foot soil cover would be placed over the lead contaminated soil with a concentration above 400 mg/kg. Every effort would be made to preserve the Copperas Factory foundations. **Cost: \$0.6 million.**

**SED-2: Monitored Natural Recovery.** The assumption for this cleanup option is that the NTCRA and Lord Brook Source Area cleanup actions along with natural sediment transport and burial processes will result in sediment that will no longer be toxic to aquatic organisms at some point in time after the completion of the source control actions. Monitoring would be performed to evaluate changes in the sediment over time. **Total Cost: \$0.4 million**

**IA-4: Monitoring and Institutional Controls.** Monitoring to confirm that the post-NTCRA acid rock drainage does not violate federal or state water quality standards and land use restrictions to prevent the exposure of additional mine waste. **Total Cost \$0.253 million**

**SW-2: Monitoring and Institutional Controls.** Long-term monitoring of the groundwater and land use restrictions. These restrictions may take the form of restrictive covenants, local ordinances, or deed notices to prevent future use of contaminated groundwater. All of the properties that are located above the underground workings as well as the properties within the area of groundwater impacts associated with TP-1, TP-2, and TP-3 will have some type of land use restriction to prevent future use of the groundwater within the underground workings or

contaminated groundwater associated with TP-1, TP-2, and TP-3. **Total Cost: \$0.5 million.**

### **Public Involvement at the Elizabeth Mine**

To address community concerns and to serve as a focal point for discussion with EPA, the Elizabeth Mine Community Advisory Group (EMCAG) was formed in April 2000. It consists of ten member organizations representing a cross section of the community.

The EMCAG member organizations are:

- Town Strafford Selectboard
- Town of Thetford Selectboard
- Elizabeth Mine Study Group (EMSG)
- Citizens for a Sensible Solution (CASS)
- Elizabeth Mine Survivors
- Adjacent Landowners and Residents
- Non-residential Landowners
- Thetford Conservation Commission
- Strafford Planning Commission
- Strafford Historical Society

The EMCAG has been actively engaged in a dialogue with EPA and Vermont ANR for over six years. The EMCAG provided input to shape the NTCRA, TCRA, and the RI/FS. The commitment and perseverance of the EMCAG members is a testament to the community's desire to be an integral part of the cleanup action at the Site.

Working with the EMCAG, EPA developed a process for extensive community involvement in shaping the cleanup at the Site. EPA provides the EMCAG with technical briefings presenting design plans, descriptions of investigation programs, and results of studies and investigations in advance of the formal reports. The alternatives under consideration in the RI/FS were presented to the EMCAG six months prior to the public comment period. EPA took the input from the community into consideration in the development and evaluation of the cleanup options.

To further support community involvement, EPA has provided the community with technical resources through the Technical Assistance Grant (TAG) and the Technical Outreach Services to Communities (TOSC) programs. These programs provided the community with independent university and private professional experts to evaluate the EPA Reports. EPA also provided the Towns of Strafford and Thetford with a Redevelopment Initiative Grant which was used to hire experts to assist in evaluating future use options for the Site once the cleanup is complete. EPA will continue its dialogue with the EMCAG during the implementation of the cleanup actions described in the Proposed Plan.

## **The history and historic significance of the Elizabeth Mine**

The industrial history of the Elizabeth Mine began with the discovery of a massive sulfide ore body along a ridge located southeast of South Strafford village in 1793. The mine was initially worked for the sulfide mineral pyrrhotite to manufacture copperas. Copperas is a crystalline green hydrous iron sulfate that has been used for a variety of purposes including: production of sulfuric acid; a disinfectant and sheep dip; astringent medicine; to blacken and color leather; and as a drier in ground pigment manufacturing. Major production of Copperas began in 1810 and ended in the 1880's. In 1830, Strafford Copper Works was formed to extract copper from the mine. During the early mining operations, copper was smelted on-site. Underground mining began in the early to mid-1800s. The mine was worked intermittently for copper from 1830 until 1930. In 1942, the mine reopened in response to World War II. Most of the underground copper mining occurred between 1942 and the mine's final closure in 1958.

The copperas production area includes 12 acres at the top of the Copperas Brook watershed adjacent to the North Open Cut. This area contains colorful piles of variably pyrolyzed sulfide ore that are part of the "heap leach" piles from the copperas production. Some of the heap leach piles are overlaid by waste rock from some of the earliest copper mining at the Site. This area is known as TP-3. The tailing in areas designated as TP-1 and TP-2 were generated through the milling of sulfide ores between 1942 and 1958. A sulfide flotation mill was constructed during this period, where the ore was refined and the resulting concentrate was shipped to off-site smelters. The remaining material was pumped to settling ponds, resulting in the formation of the tailing piles. Today, an orange iron-oxide rich "rind" covers the surface of TP-1 and TP-2 to a depth of one to two feet below the tailings surface. Below this oxidized cap, a uniform layer of black sulfide-rich anoxic tailing extends to the base of each pile.

The Elizabeth Mine is an historic resource that embodies the distinctive landscape, engineering, and architectural resources that are characteristic of an early nineteenth- to mid-twentieth-century American metal mining and processing site. It constitutes one of the largest and most intact historic mining sites in New England and includes the only intact cluster of hard-rock mining buildings in the region. The Elizabeth Mine was the site of a major nineteenth century U.S. copperas manufacturing plant and is associated with successful patents for copperas production. It is also associated with a number of significant commercial, scientific, and political figures, including Isaac Tyson, Jr., a Baltimore, Maryland-based chemical and mining figure who was recently inducted into the American Institute of Mining, Metallurgical and Petroleum Engineers' (AIME) Mining Hall of Fame. EPA has determined the Elizabeth Mine Site to be eligible for

listing on the National Register of Historic Places. As part of the RI, EPA has documented the historic resources at the Site in several reports that are contained in the Administrative Record for the Site.

## **How you can learn more about the cleanup proposal?**

In addition to this fact sheet, EPA has released a Proposed Plan describing the cleanup actions that are submitted for public comment. The Administrative Record for the Site will contain the Proposed Plan along with the supporting documentation, including the Remedial Investigation, Human Health Risk Assessment, Baseline Ecological Risk Assessment, and Feasibility Study Reports. You can find additional information at the following Site Repositories:

EPA Records Center  
1 Congress Street, Suite 1100  
Boston, MA 02114-2023  
(617) 918-1453  
Hours: 10:00 a.m.-noon, 2:00 p.m.-5:00 p.m.

Norwich Public Library  
368 Main St.  
Norwich, VT 05055  
802-649-1184  
Hours: Monday 1:00 p.m. – 8:00 p.m.  
Tue, Wed, and Friday: 10:00 a.m. – 5:30 p.m.  
Thursday: 10:00 a.m. – 8:00 p.m.  
Saturday: 10:00 a.m. – 3:00 p.m.

Copies of most of the Site documents can also be reviewed at the Strafford and Thetford Town Offices as well as the offices of the Vermont Department of Environmental Conservation.

EPA also has information available on the EPA website for the Elizabeth Mine: <http://www.epa.gov/ne/superfund/index2.htm> Select "VT" in the Long-Term Cleanup Sites (NPL) by State box and then select "Elizabeth Mine". You may also find information about the Site and the Elizabeth Mine Community Advisory Group (EMCAG) at: [www.dartmouth.edu/~cehs/CAGsite/welcome.html](http://www.dartmouth.edu/~cehs/CAGsite/welcome.html)

If you have any questions about the Elizabeth Mine, please contact any of the following:

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